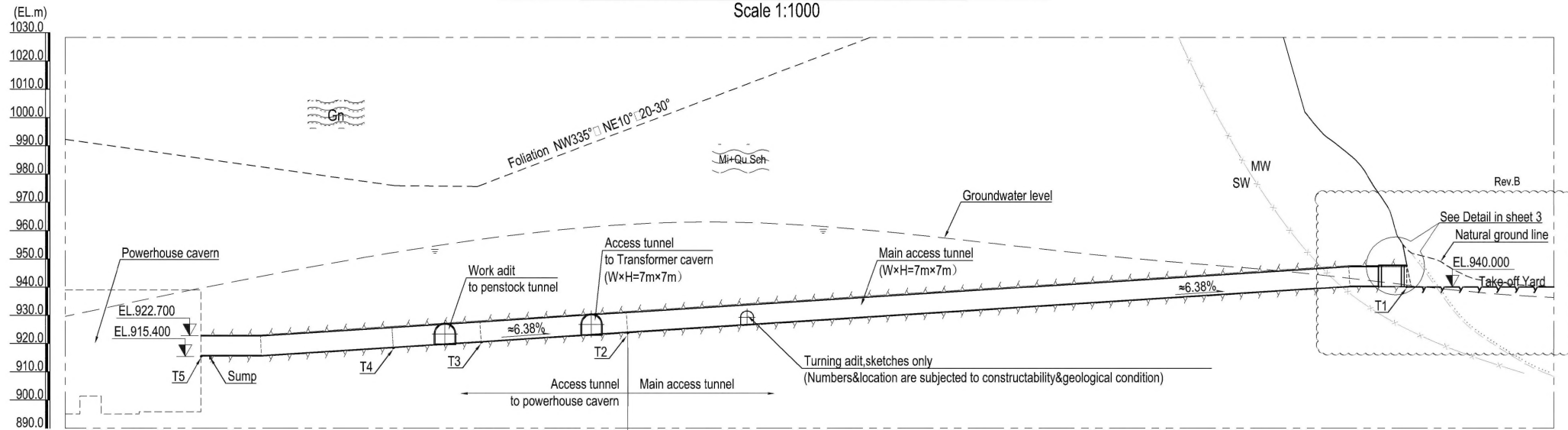
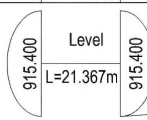
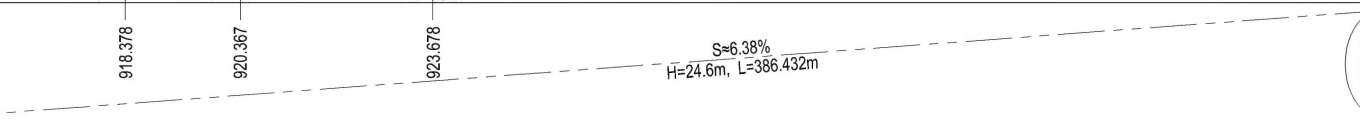


LONGITUDINAL PROFILE OF ACCESS TUNNEL (TO POWERHOUSE CAVERN)

Scale 1:1000



Chainage (m)	CP0+151.143		CP0+129.776	CP0+083.090		CP0+051.910		CP0+000.000		CH0+275.873												CH0+020.000	CH0+000.000			
Vertical alignment				918.378		920.367											940.000	Level L=20m		940.000						
Distance (m)	E.P. 427.016	420	400	380	358.963	340	327.763	320	300	280	275.873	260	240	220	200	180	160	140	120	100	80	60	40	20	0.0	B.P.
Assumed rock classification	II												III													
Support type	Support type of class II												Support type of class III													
Overlying rock thickness	294m ~ 402.8m												7.7m ~ 294m													

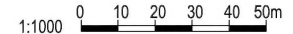
TUNNEL SUPPORT PATTERN

Rock mass quality	40≥Q		10≤Q<40		4≤Q<10		1≤Q<4		Q<1			
Support type	I		II		III		IV (Without steel support)		IV (With steel support)		V Same as type IV (With steel support)	
Inner dimension(m)	W=7m`H=7m											
	Excavation Parameter											
ESR	1.3		1.3		1.3		1.3		1.3			
Excavation span(m)	3		3		2		1.5		0.5~1			
Calculated MUS*(m)	11		9		5		3		1			
MUS* for shotcrete application(m)			9		2		1.5		1			
MUS* for rock dowel installation(m)			6		4		3		0.5~1			
MUS* for steel support installation(m)							0.5~1.0		0.5~1			
Excavation method						Blasting		Blasting/mechanically			Mechanically	
Initial support parameters												
Weep hole: Φ50mm,L=0.5m / 0.8m	where necessary											
Plastic fiber shotcrete,f _c =25MPa	T=50mm		T=50mm		T=100mm		T=100mm		T=160mm		For class V rock, the same support scheme as class IV rock can be adopted after grouting is used to improve the integrity and firmness of surrounding rock.	
Rock dowel` D25,L=3m,alternately	Spot		@2.5m×2.5m		@2m×2m		@1.5m×1.5m		@1.0m×1.0m			
Steel support, MB150 (or lattice girder)									@1m			
Forepoling grouted dowel,D25mm, @400mm, L=6m									where necessary			
*MUS = Maximum Unsupported Span.												

NOTE

- All dimensions are in millimeters, and coordinates, chainages & elevations are in meters.
- The excavation and support methods can be adjusted according to the actual situation after the geological conditions are revealed.
- It is evident that the maximum unsupported span is a guideline, only, and needs continuous adjustment to the prevailing rock conditions and construction requirements at the spot.
- The cylinder specified compressive strength of tunnel shotcrete and cement mortar at 28 days of age is 25MPa.
- The specified compressive strength of concrete is the cylinder strength at age of 28 days.
- The yield strength and of steel is 250MPa.
- Rust preventive compound will be sprayed on exposed surface of steel structure.
- Symbol description:
A-Line is the design excavation line.
B-Line is the overbreak line.
R denotes round bar, yield strength of the round bar is 280MPa.
D denotes deformed bar, yield strength of the deformed bar is 500MPa;
- The forepoling is mainly used in the tunnel section with poor surrounding rock geology, which should be used together with dowel and steel support (or lattice girder), and the spacing of dowel should be consistent with that of steel support.
- The detail of weep holes, rock dowel, steel support and steel lattice girder see the drawing No. UT1-C-000-CVL-DG-40001.
- The end position of the access tunnel may be adjusted according to the final design of the powerhouse.
- The steel support (or lattice girder) to rock class V / IV is subjected to the exposed geological condition.
- See subsequent drawings for concrete structure and reinforcement.

Scale:



REFERENCE DRAWINGS

UT1-C-000-CVL-DG-40001	DETAILED DESIGN DRAWING OF EXCAVATION AND SUPPORT FOR UNDERGROUND CAVERN
UT1-C-090-CVL-DG-64001	SURROUNDING ROCK STABILITY CALCULATION OF ACCESS TUNNEL FOR POWERHOUSE
UT1-C-090-CVL-DG-64001	LAYOUT OF ACCESS TUNNEL TO POWERHOUSE

SYMBOL AND LEGEND

FOR APPROVAL

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0A	28.JUL.2021	First issue	ZHANG J.Q.	WANG H.Q.	LI W.G.

PROJECT TITLE

Upper Trishuli-1 HEP (216MW)

OWNER
NWEDC
NEPAL WATER AND ENERGY DEVELOPMENT CO. PVT. LTD.OWNER'S ENGINEER
TRACTEBEL
CHNG
JADE CONSULTCONTRACTOR
DOOSAN Enerbility

DRAWING TITLE

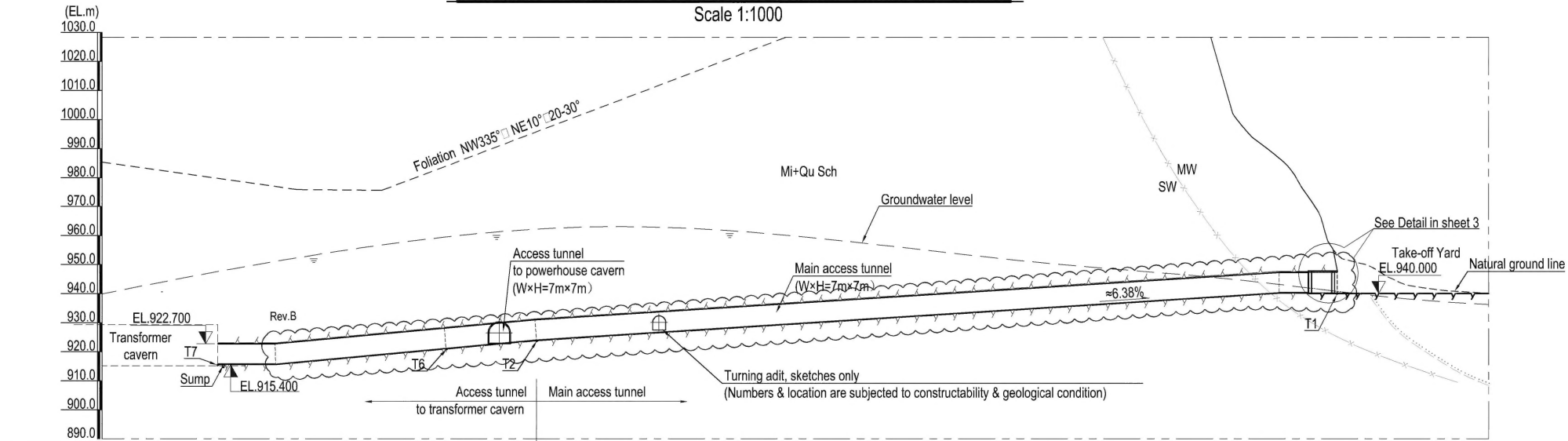
EXCAVATION AND SUPPORT OF ACCESS TUNNEL
TO POWERHOUSE (1 / 6)

INDEX	DRAWING NUMBER	SHEET NO.	REV. NO.
A	UT1-C-090-CVL-DG-64002- 01	1 OF 6	0B

A1 (594 x 841 MM) 1

LONGITUDINAL PROFILE OF ACCESS TUNNEL (TO TRANSFORMER CAVERN)

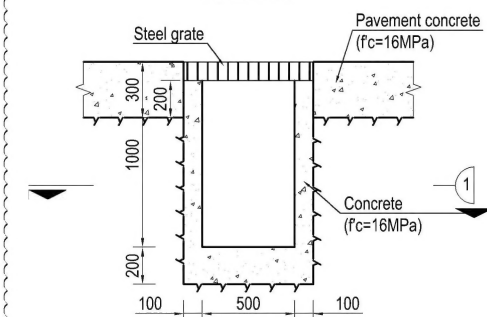
Scale 1:1000



Chainage (m)	CT0+109.840		CT0+089.840		89840		CT0+031.180		CT0+000.000		CM0+275.873										CM0+020.000		CM0+000.000																	
Vertical alignment					920.810				923.678																															
Distance (m)	385.863 E.P.		360		340		320		307.053		280 275.873		260		240		220		200		180		160		140		120		100		80		60		40		20		0.0 B.P.	
Assumed rock classification	II											III																												
Support type	Support type of class II											Support type of class III																												
Overlying rock thickness	294m ~ 402.8m											7.7m ~ 294m																												

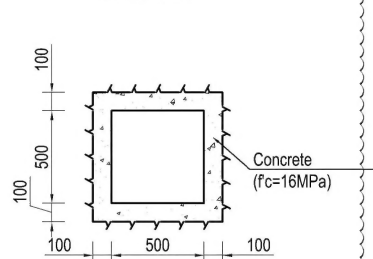
DETAIL OF SUMP

Scale 1:20



SECTION 1-1

Scale 1:20



NOTE

1. All dimensions are in millimeters, and coordinates, chainages & elevations are in meters.

LEGEND:

- MW SW Inferred boundry between moderately weathered and slight weathered
Excavation line

Scale:

1:1000 0 10 20 30 40 50m

REFERENCE DRAWINGS

UT1-C-000-CVL-DG-40001	DETAILED DESIGN DRAWING OF EXCAVATION AND SUPPORT FOR UNDERGROUND CAVERN
UT1-C-090-CVL-DG-64001	SURROUNDING ROCK STABILITY CALCULATION OF ACCESS TUNNEL FOR POWERHOUSE
UT1-C-090-CVL-DG-64001	LAYOUT OF ACCESS TUNNEL TO POWERHOUSE

SYMBOL AND LEGEND

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0A	28.JUL.2021	First issue	ZHANG J.Q.	WANG H.Q.	LI W.G.

PROJECT TITLE

Upper Trishuli-1 HEP (216MW)

OWNER
NWEDC
NIPAL WATER AND ENERGY DEVELOPMENT CO. PVT. LTD.

OWNER'S ENGINEER
TRACTEBEL
CHNG
jade
CONSULT

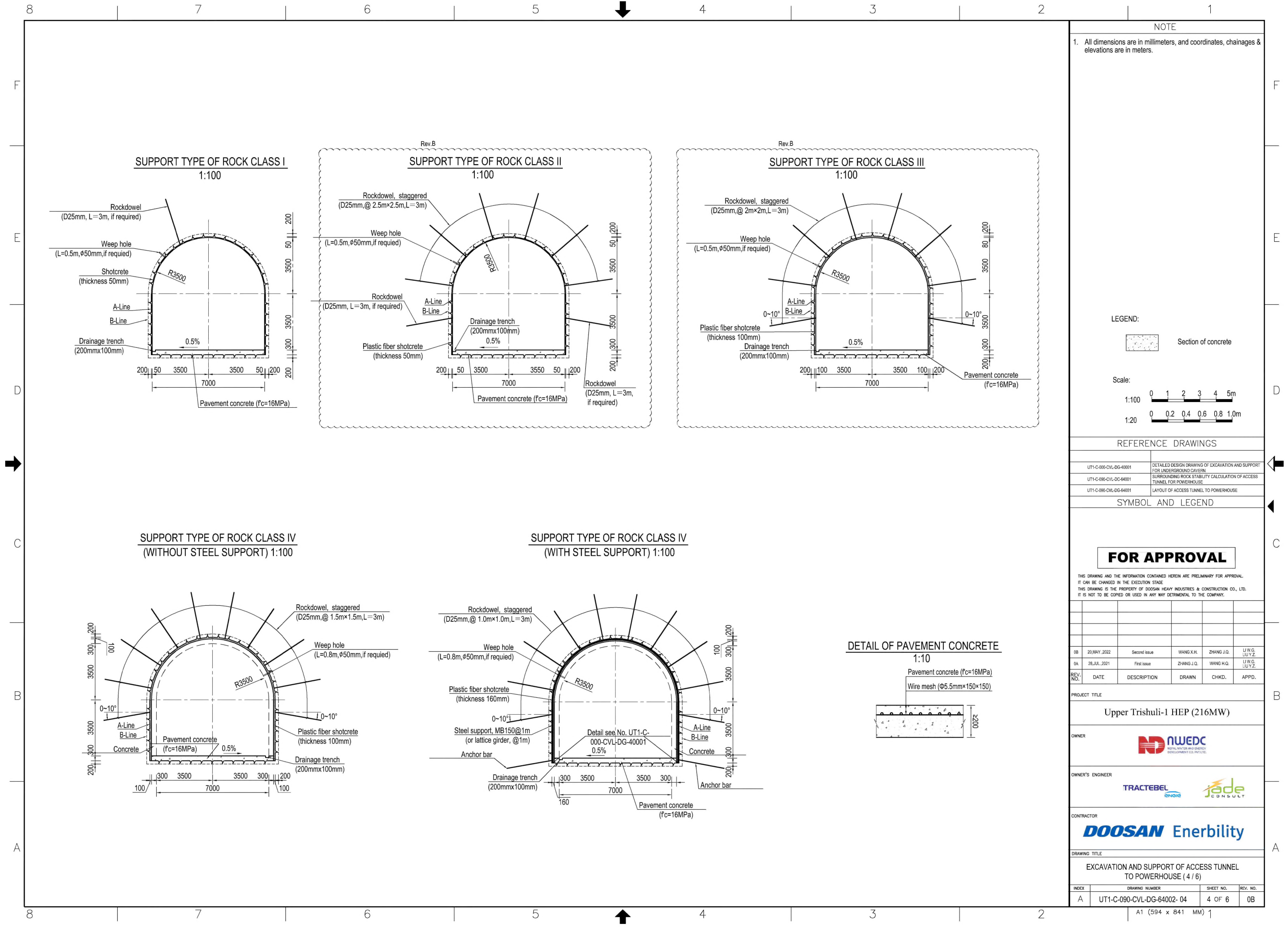
CONTRACTOR
DOOSAN Enerbility

DRAWING TITLE

EXCAVATION AND SUPPORT OF ACCESS TUNNEL TO POWERHOUSE (2 / 6)

INDEX	DRAWING NUMBER	SHEET NO.	REV. NO.
A	UT1-C-090-CVL-DG-64002- 02	2 OF 6	0B

A1 (594 x 841 MM) 1



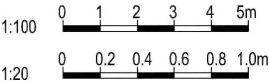
NOTE

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LEGEND:

Section of concrete

Scale:



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PROJECT TITLE

Upper Trishuli-1 HEP (216MW)

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NIPAL WATER AND ENERGY DEVELOPMENT CO. PVT. LTD.

OWNER'S ENGINEER

TRACTEBEL
CHNG

jade
CONSULT

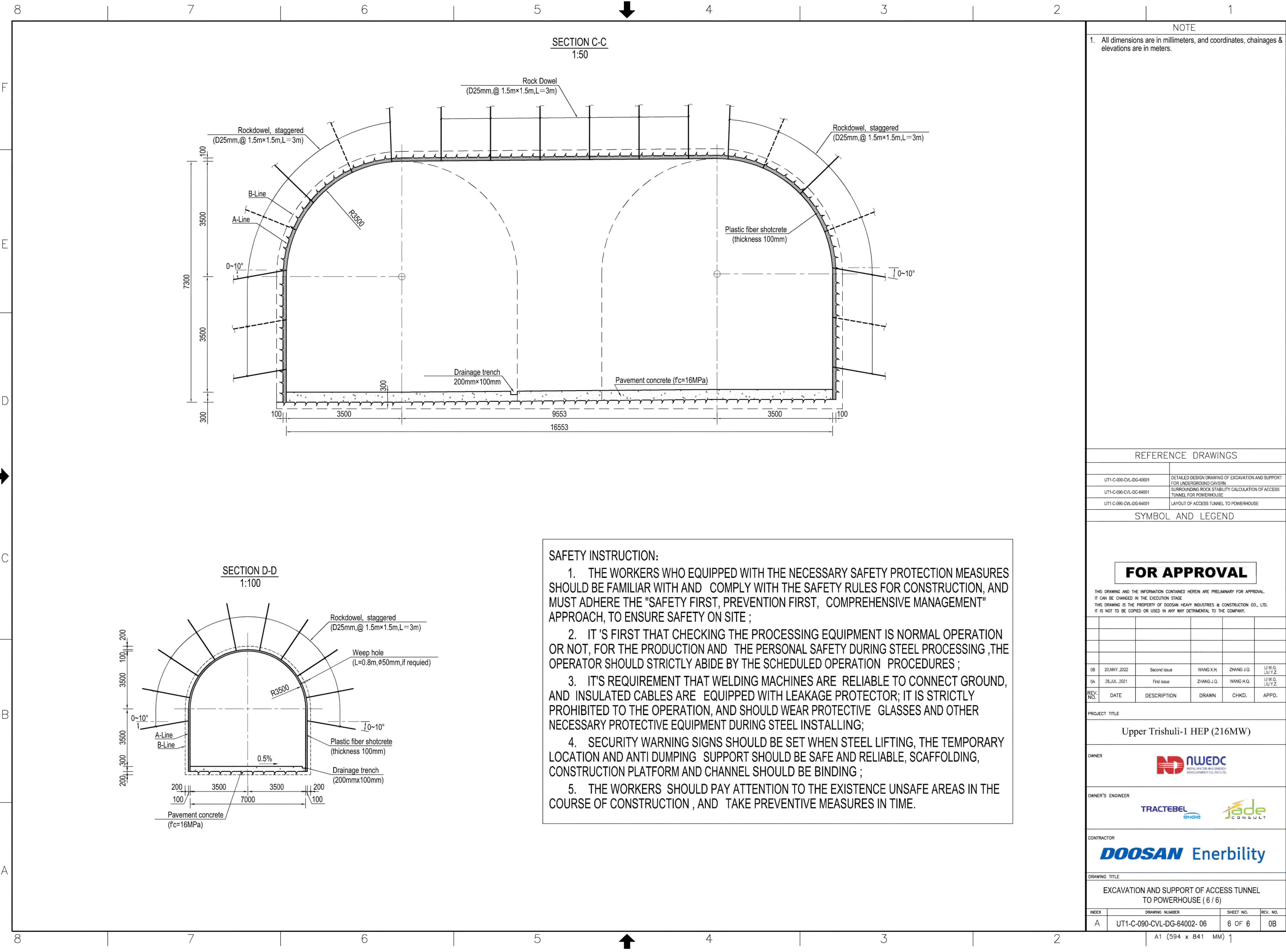
CONTRACTOR

DOOSAN Enerbility

DRAWING TITLE

EXCAVATION AND SUPPORT OF ACCESS TUNNEL TO POWERHOUSE (4 / 6)

INDEX	DRAWING NUMBER	SHEET NO.	REV. NO.
A	UT1-C-090-CVL-DG-64002- 04	4 OF 6	0B



SAFETY INSTRUCTION:

1. THE WORKERS WHO EQUIPPED WITH THE NECESSARY SAFETY PROTECTION MEASURES SHOULD BE FAMILIAR WITH AND COMPLY WITH THE SAFETY RULES FOR CONSTRUCTION, AND MUST ADHERE THE "SAFETY FIRST, PREVENTION FIRST, COMPREHENSIVE MANAGEMENT" APPROACH, TO ENSURE SAFETY ON SITE ;
2. IT 'S FIRST THAT CHECKING THE PROCESSING EQUIPMENT IS NORMAL OPERATION OR NOT, FOR THE PRODUCTION AND THE PERSONAL SAFETY DURING STEEL PROCESSING ,THE OPERATOR SHOULD STRICTLY ABIDE BY THE SCHEDULED OPERATION PROCEDURES ;
3. IT'S REQUIREMENT THAT WELDING MACHINES ARE RELIABLE TO CONNECT GROUND, AND INSULATED CABLES ARE EQUIPPED WITH LEAKAGE PROTECTOR; IT IS STRICTLY PROHIBITED TO THE OPERATION, AND SHOULD WEAR PROTECTIVE GLASSES AND OTHER NECESSARY PROTECTIVE EQUIPMENT DURING STEEL INSTALLING;
4. SECURITY WARNING SIGNS SHOULD BE SET WHEN STEEL LIFTING, THE TEMPORARY LOCATION AND ANTI DUMPING SUPPORT SHOULD BE SAFE AND RELIABLE, SCAFFOLDING, CONSTRUCTION PLATFORM AND CHANNEL SHOULD BE BINDING ;
5. THE WORKERS SHOULD PAY ATTENTION TO THE EXISTENCE UNSAFE AREAS IN THE COURSE OF CONSTRUCTION , AND TAKE PREVENTIVE MEASURES IN TIME.

NOTE

1. All dimensions are in millimeters, and coordinates, chainages & elevations are in meters.

REFERENCE DRAWINGS

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OWNER'S ENGINEER
TRACTEBEL
CHINA

CONTRACTOR
DOOSAN Enerbility

DRAWING TITLE

EXCAVATION AND SUPPORT OF ACCESS TUNNEL TO POWERHOUSE (6 / 6)

INDEX	DRAWING NUMBER	SHEET NO.	REV. NO.
A	UT1-C-090-CVL-DG-64002- 06	6 OF 6	0B